



Distributed Energy Resources Hands-on Training for Federal Energy Managers



***Sandia National Labs
National Renewable Energy Lab***

Assisted by:

**Ingersoll-Rand
Capstone**

Supported by:



Federal Energy Management Program

Purpose of Training

Goal:

- Become familiar with DER technologies

Opportunity:

- Operate various distributed resources

Disclaimer:

- No endorsements intended or implied



Course Notebook & CD

- Copies of presentations
- Sample technical manuals
& bulletins
- Glossary of terms
- DER Industry Websites
- Government DER Resources
- Publications
- Staff contact info
- CD Web links live

Terminology

Distributed Energy Resources

Distributed Generation

Distributed Resources

(DER = DG = DR = Energy near the Load)


Distributed Energy Technologies Lab

- Glossary of Terms in Notebooks
 - Acronyms – Please ask!

March 12 Schedule

8:30 am – 4:30 pm

Start	Finish	Topic	Tab	Speaker
8:30	8:45	Introductions		
8:45	9:00	Course Overview		Jerry Ginn
9:00	9:30	DER Operating Modes	1	Jerry Ginn
9:30	10:30	DER Technologies and Features	2	Abbas Akhil
10:30	12:00	DETL Equipment - Orientation & Safety	3	Tom Byrd
12:00	12:30	Catered Box Lunch		
12:30	1:00	Battery Charging	4	Jerry Ginn
1:00	2:30	Economic Evaluation of DER	5	Ed Henderson
2:30	2:45	Break		
2:45	3:30	Installation Considerations	6	John Stevens
3:30	4:00	Field Examples		Mike Lasky Doug Price Jim Watts
4:00	4:30	Daily Discussion and Wrap-up		
4:30		Adjourn		



March 13 Schedule

8:30 am – 4:15 pm

Start	Finish	Topic	Tab	Speaker
8:30	12:00	Operation & Maintenance (DETL hands-on)	7	Tom Byrd
12:00	12:30	Catered Box Lunch		
12:30	1:00	Energy Security and DER	8	Abbas Akhil
1:00	1:15	Break		
1:15	2:00	DER Life-Cycle-Cost-Effectiveness	9	Trina Masepohl
2:00	2:15	DD 1391 and BLCC Program Example	10	Tim Moss
2:15	2:30	Break		
2:30	3:15	Evaluating/Reporting Performance	11	John Stevens
3:15	3:45	Commissioning and Decommissioning (Acquiring and End-Of-Life Disposal)	12	Abbas Akhil
3:45	4:15	Daily Discussion and Course Evaluation		
4:15		Adjourn		



DETL FEMP Configuration

**Secure
SCADA Lab**



data/control

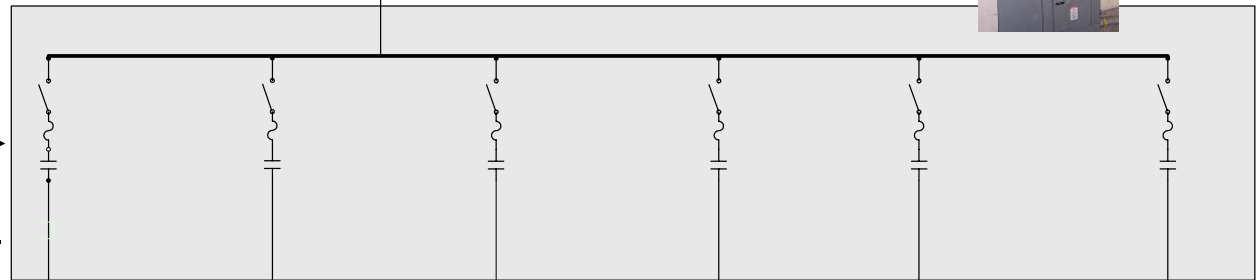
**Other Remote
DER sites**



Grid



480V Microgrid



Loads
(Various)

Distributed
Energy
Resources



FEMP Publication:

Using Distributed Energy Resources

A How-To Guide For Federal Facility Managers

Technology	Application					
	Standby Power	Low-cost Energy	Stand-alone System	Combined Heat & Power	Peak Shaving	Power Quality
Diesel Engine	✓	✓	✓	✓	✓	
Natural Gas Engine	✓	✓	✓	✓	✓	
Dual Fuel Engine	✓	✓	✓	✓	✓	
Microturbine	✓		✓	✓	✓	
Combustion Turbine	✓	✓	✓	✓	✓	
Fuel Cell			✓	✓	✓	✓
Photovoltaics		*	✓		✓	
Wind Turbine		*	✓			
Uninterruptible Power Supply (UPS)	✓					✓
Battery System	✓					✓
Flywheel						✓
Superconducting Magnetic Energy Storage (SMES)						✓
Hybrid Systems	✓	✓	✓	✓	✓	✓

* Although photovoltaics and wind turbines may not offer the lowest cost power option, their low environmental impacts greatly enhance the value of the power they provide.

Staff

Sandia

Jerry Ginn

Abbas Akhil

Tom Byrd

John Stevens

NREL

Trina Masepohl

Energy Options

Ed Henderson

Capstone

Mike Lasky

Doug Price

Ingersoll-Rand

Jim Watts

Staff Experience

- Power Systems
- Photovoltaics
- Power Electronics Testing
- Energy Storage
- Solar Thermal
- Fuel Cell
- Microturbine Testing
- Microturbine Installation (300+)
- Fielded Systems (Federal & Private)
- Government Procurements

Staff e-mails & voice mails listed



This Course & Other FEMP Resources are Yours

FEMP

- **We will help locate best resource**
- **Course aims to address your concerns**
- **Thanks for your feedback**

Welcome!!